

# **Fundamentals of Rangeland Management**

**Wild Horse & Burro Advisory Board Meeting  
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# **Society for Range Management**

The Society for Range Management is the professional scientific society and conservation organization whose members are concerned with studying, conserving, managing and sustaining the varied resources of the rangelands which comprise nearly half the land in the world



# Principles of Range Management

1. Protect rangelands as renewable resources
2. Maintain green plants to capture solar energy and sustain grazing animals
3. Provide protection to soil, water, vegetation, and climate
4. Sustain multiple uses of rangelands (food, water, wildlife habitat, recreation, ecosystem dynamics)



# Principles of Range Management

1. **Precipitation** is the single most important factor determining type and productivity of vegetation

- Drought
- Wind
- Temperature

2. **Soil** influences forage production

- Texture
- Structure
- Depth
- Organic matter



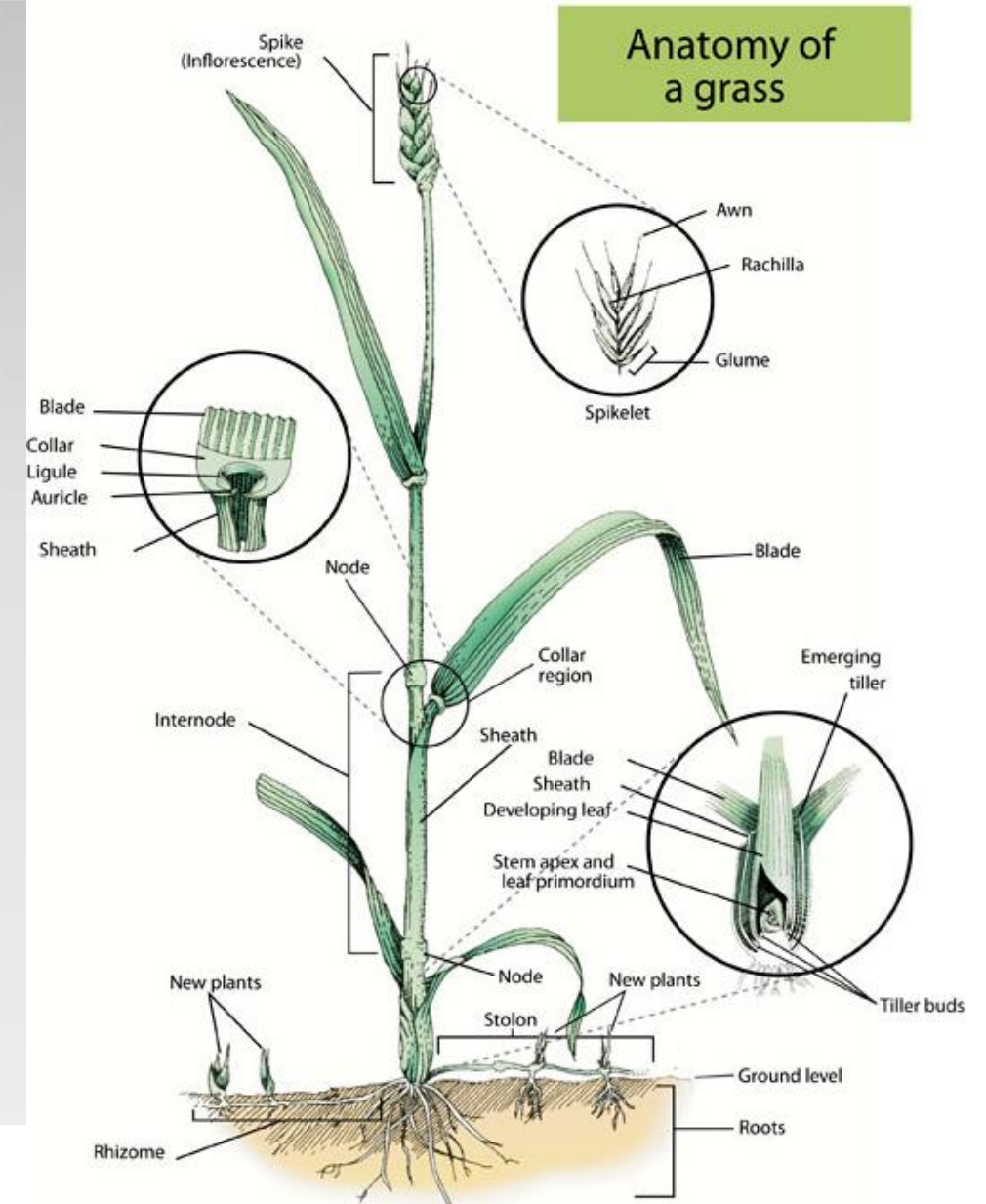
# Principles of Grazing Management

- Animal density (stocking rate) is the most important of all grazing management decisions
  - Frequency, intensity and duration of grazing
- Carrying (grazing) capacity
  - Maximum stocking rate year and year without causing damage to vegetation or related resources (conservation of water, soil, plants)
- Emphasis on community level interactions
  - Important to understand individual plant species responses



# Grass Morphology

- Phytomer
  - Leaf
  - Node
  - Axillary bud
  - Internode
- Respond to grazing with tillering and branching
- Spreading root system to access water

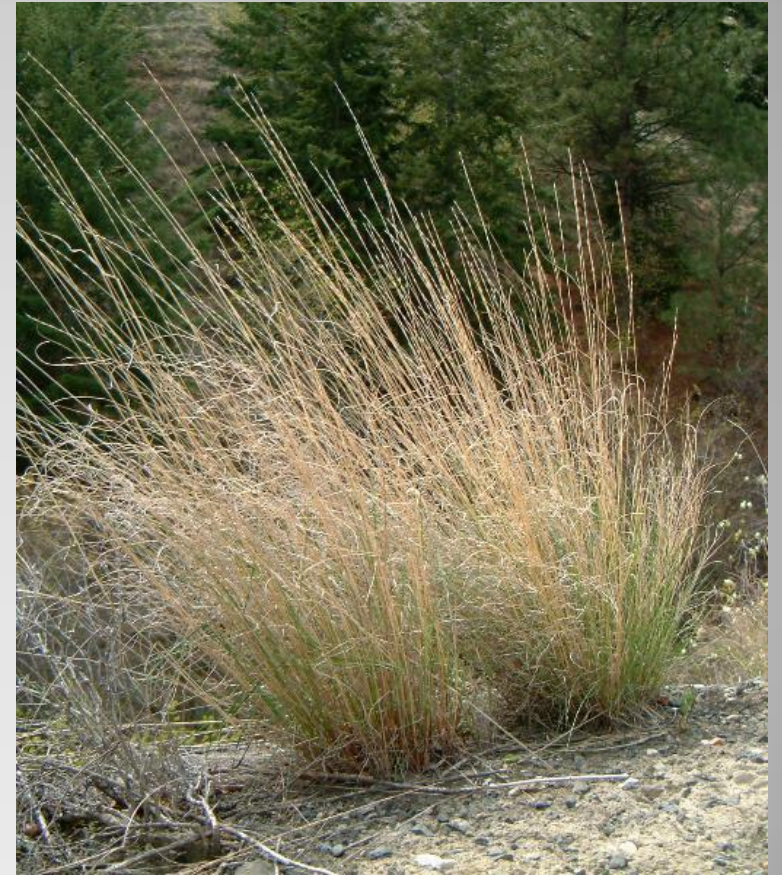


# Principles of Grazing Management

- Excessive removal of plant leaves destroys photosynthetic capability and can ultimately kill a plant
- Vegetation residue is important to plants to protect the plant crown and soil
- Plants highly resistant to grazing are generally less productive and palatable than plants with low grazing resistance
  - Energy put into secondary compounds or leaf structures that deter grazing

# bluebunch wheatgrass vs. crested wheatgrass

- Following defoliation
  - Crested WG plants re-established a canopy 3-5 times the photosynthetic surface (more tillers)
  - Crested had lower investment of nitrogen and biomass per unit area (more tolerant to partial grazing)
  - Crested had greater flexibility of resource allocation
  - Both had low carbohydrate pools in leaves and roots with severe defoliation

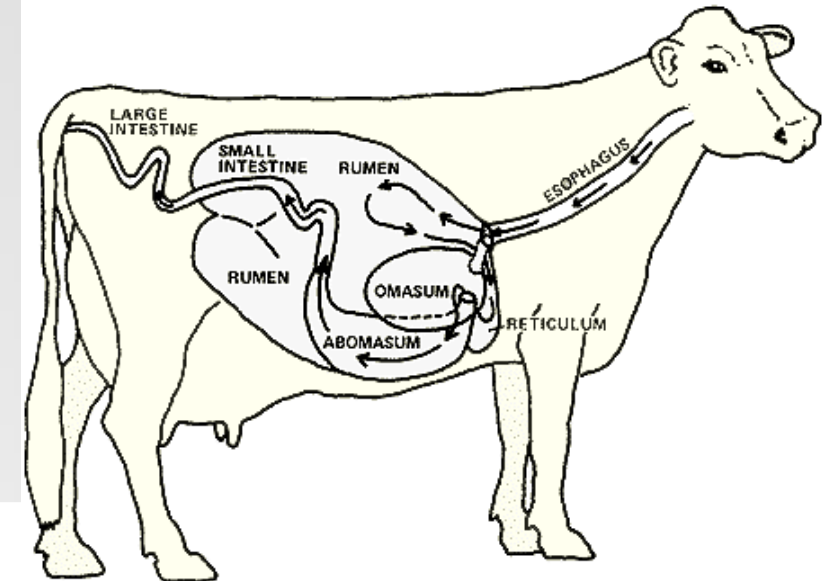
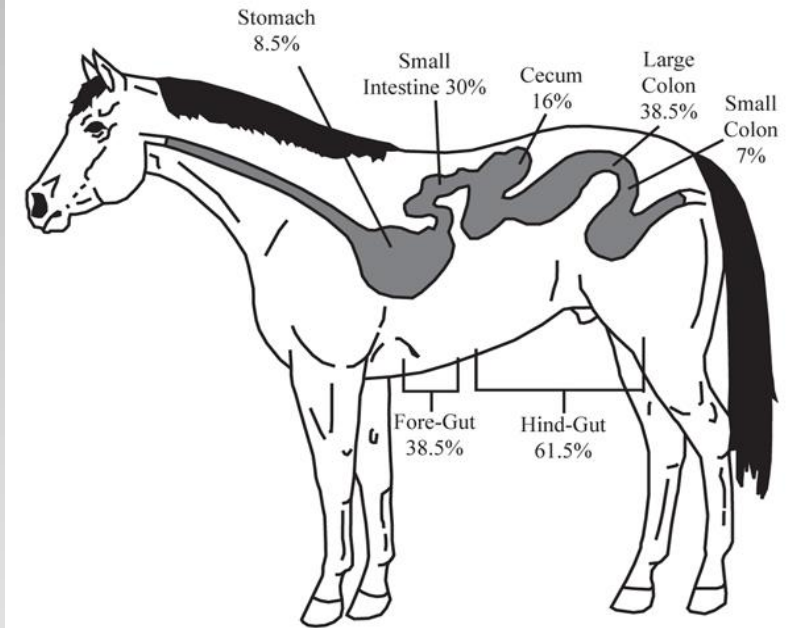


Caldwell et al. 1981. Coping with herbivory: photosynthetic capacity and resource allocation in two semi-arid *Agropyron* bunchgrasses. *Oecologia* 50:14-24.



# Animal Digestion

- Ruminant vs. Hind-Gut (Cecal) Digestion
- Horse's stomach is 8.5-10% of capacity of digestive system
  - Eat small amounts often
  - Microfloral digestion in hindgut
- Animal Unit Month (AUM)
  - Cow: 1 AUM (1000 lb cow and calf)
  - Horse: 1.25
  - Sheep: 0.2



# Dentition and Biting Strategies

Cows wrap tongue around plant and pull

Horses bite plants with upper and lower teeth

Sheep have similar biting pattern as horses





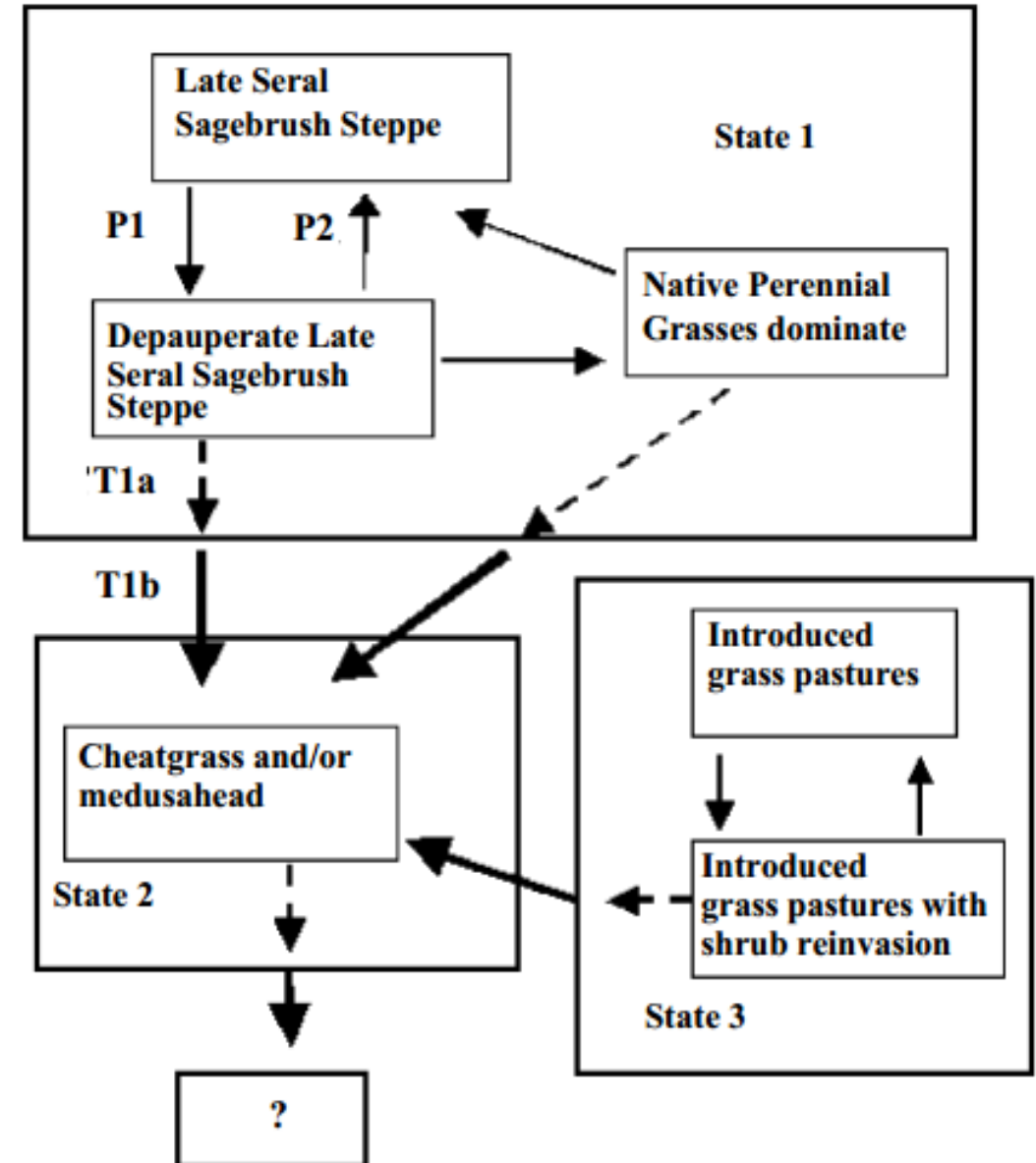
# State-and-Transition Theory

**State:** resilient and resistant complex of soil and vegetation, connected through ecological processes

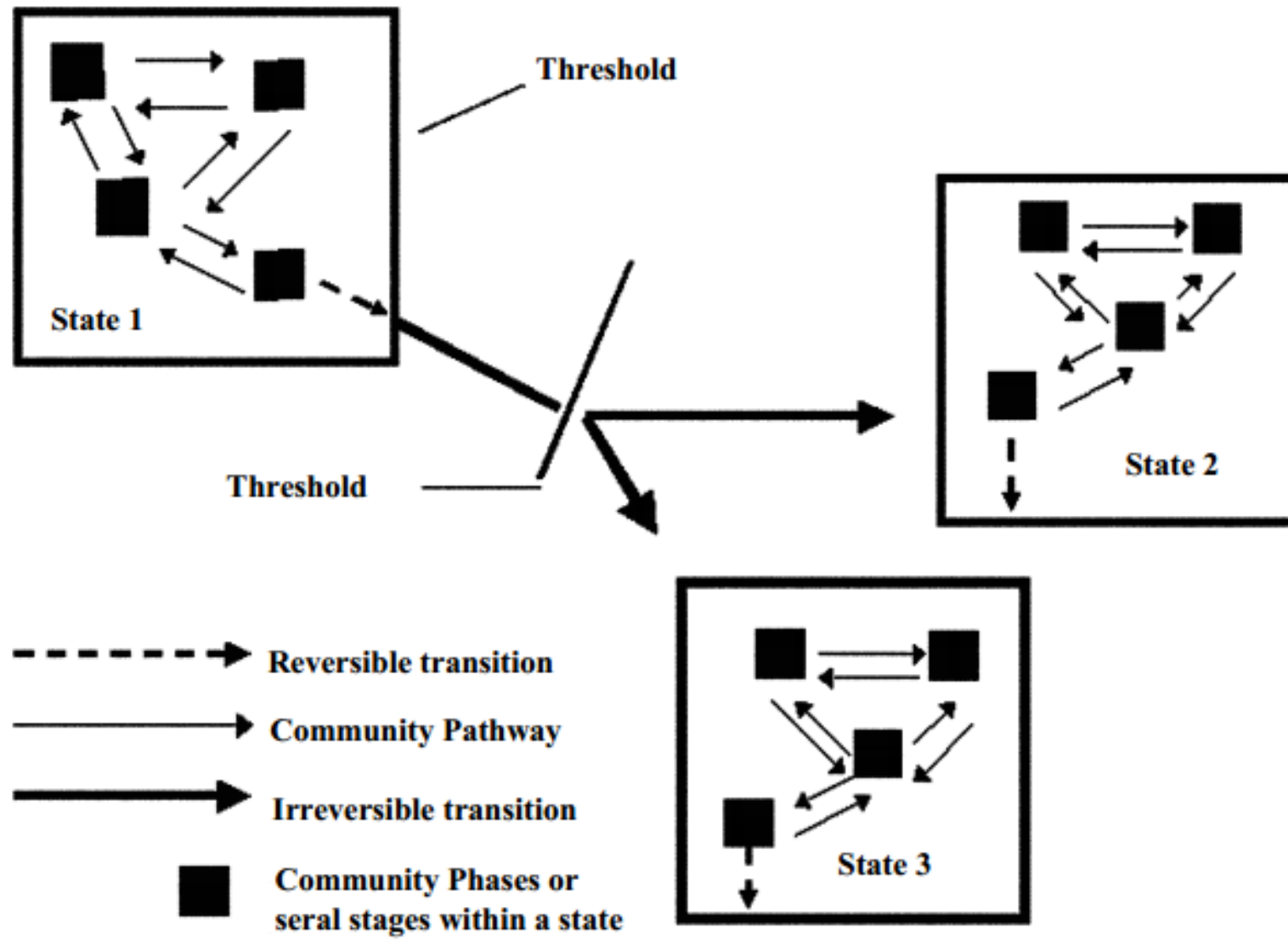
- Hydrology
- energy capture
- nutrient cycling

**Threshold:** boundary in space and time between all states

**Transitions:** trajectory of change that degrade primary ecological processes

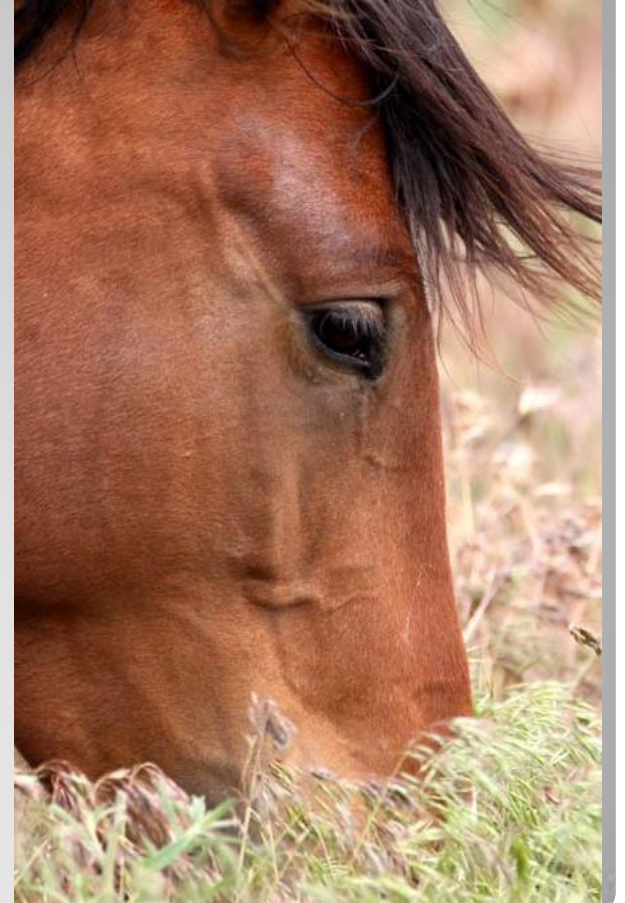




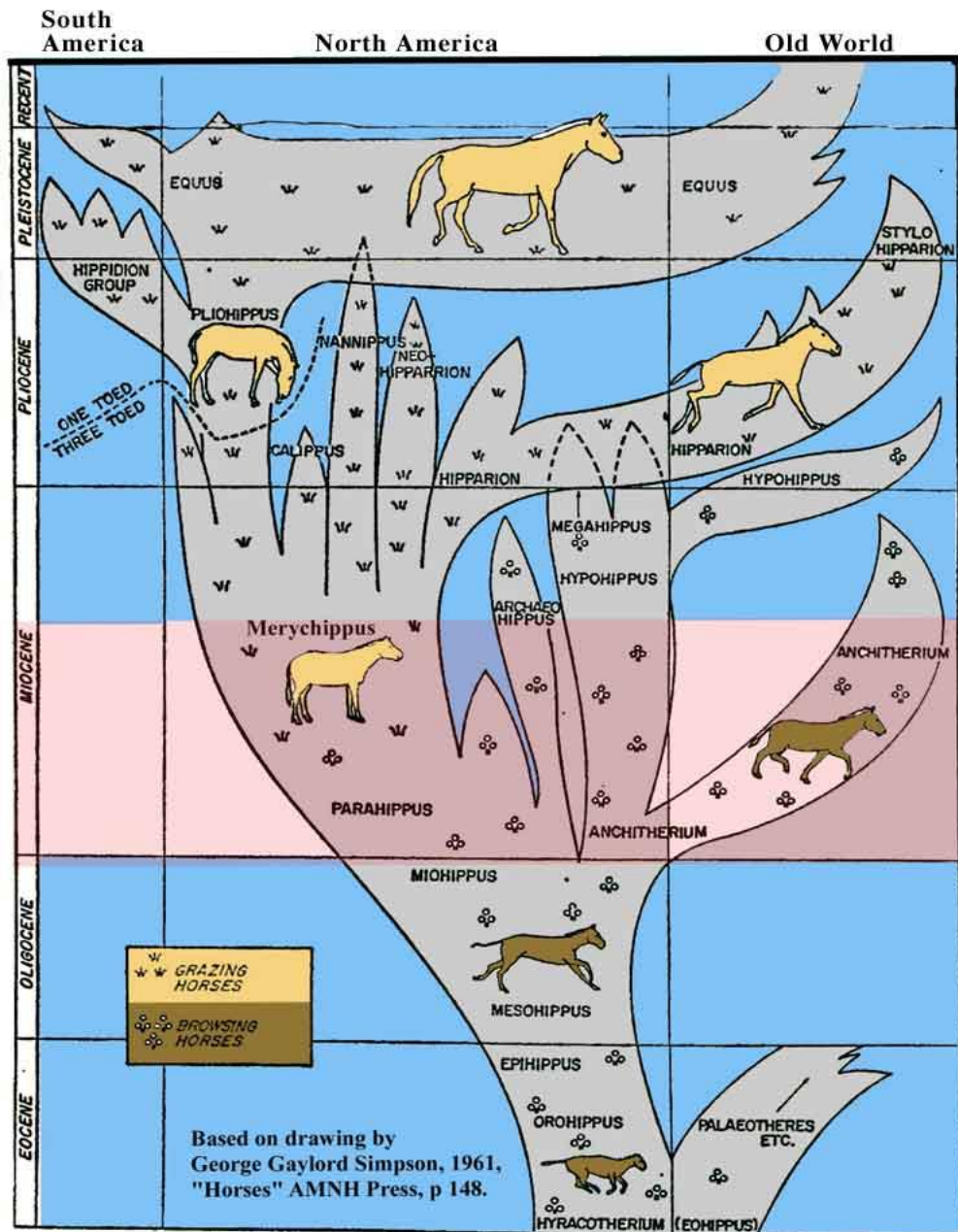


# Grazing Management and Strategies

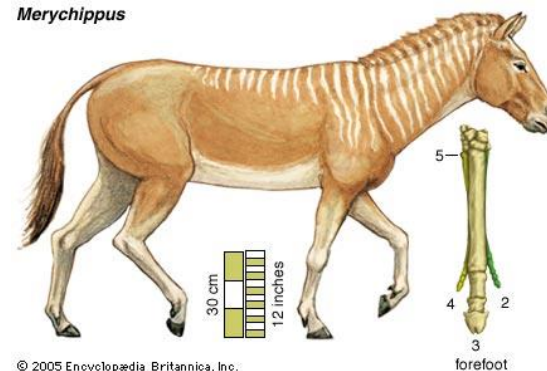
- Carefully determine stocking rates
- Deferment
  - Delay of grazing until plant reaches maturity
- Rest
  - No use of the range for a full year
  - Plants recover and benefits wildlife
- Rotation
  - Movement between pastures giving key forage species periodic non-use



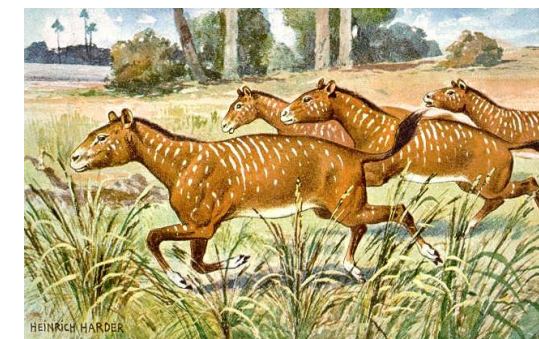
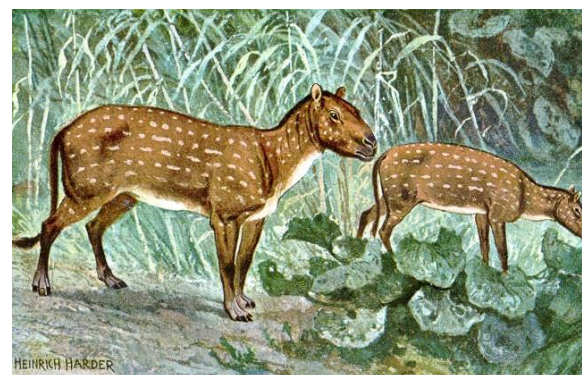




*Merychippus*



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# Horses in North America

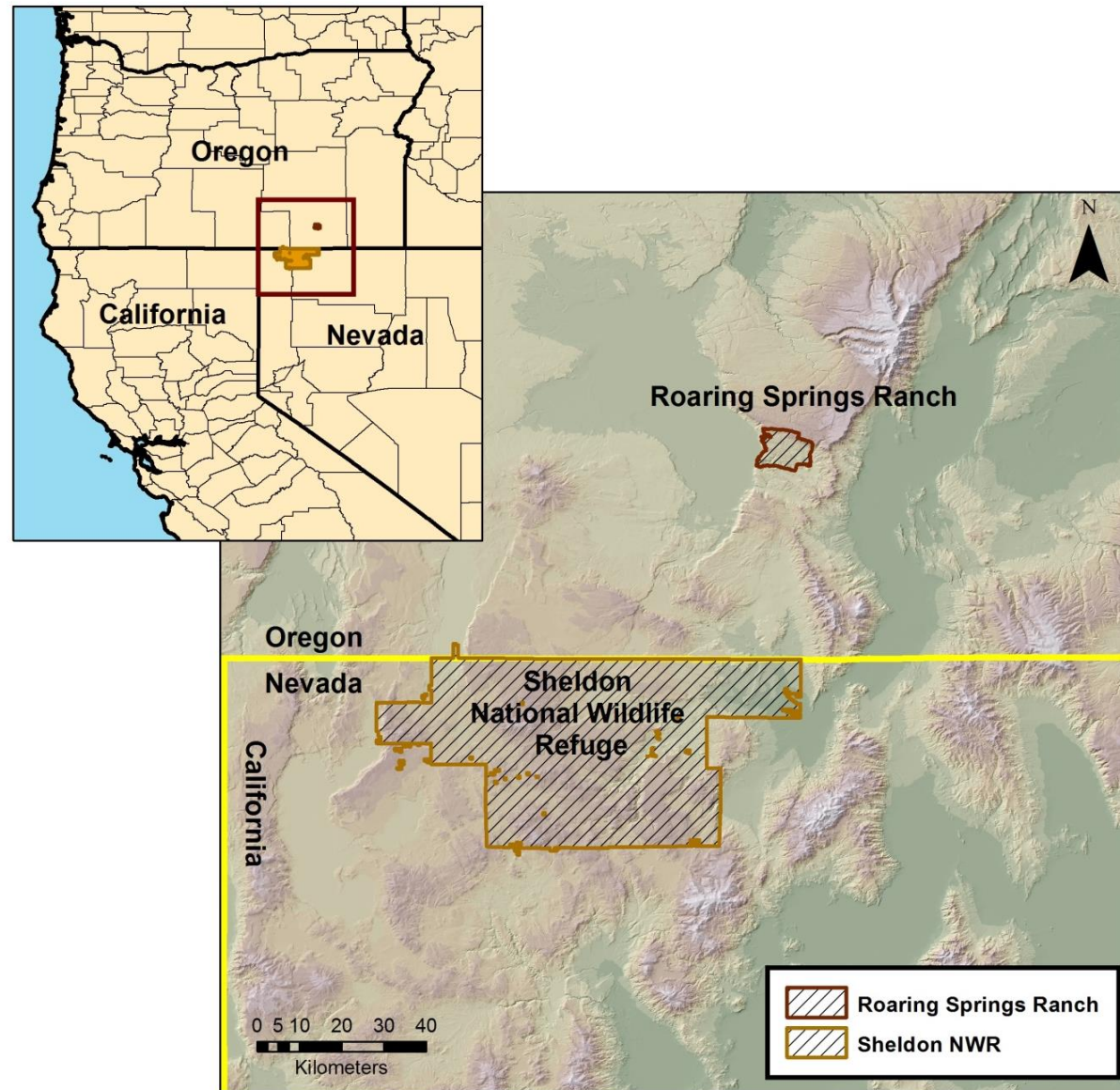
- Disappear from fossil record 10,000 – 11,000 years ago
- Occurred in Kazakhstan and Southern Ukraine 6,000 years ago
- Brought back to North America from 1493-1512 by Columbus, Cortez, Coronado, De Soto
- Spanish mission horses were lost or stolen causing a proliferation of feral horses





# Management of Horses Today

- Appropriate Management Levels (AML) – BLM multiple use mandate to balance grazing of free-roaming horses and burros with wildlife, livestock, wilderness, and recreation
- BLM directed to manage for a thriving natural ecological balance (TNEB)
  - Accomplished by setting AML (stocking rates) and managing lands to prevent rangeland deterioration



Sheldon National Wildlife Refuge, Northwestern Nevada

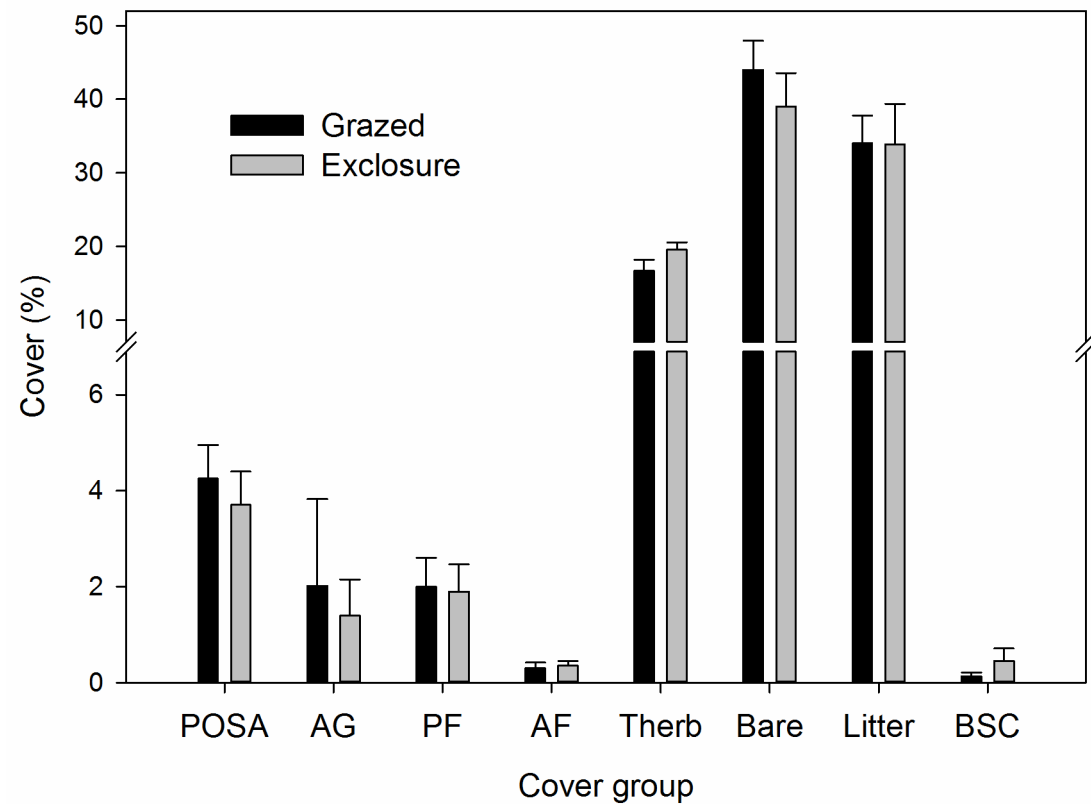
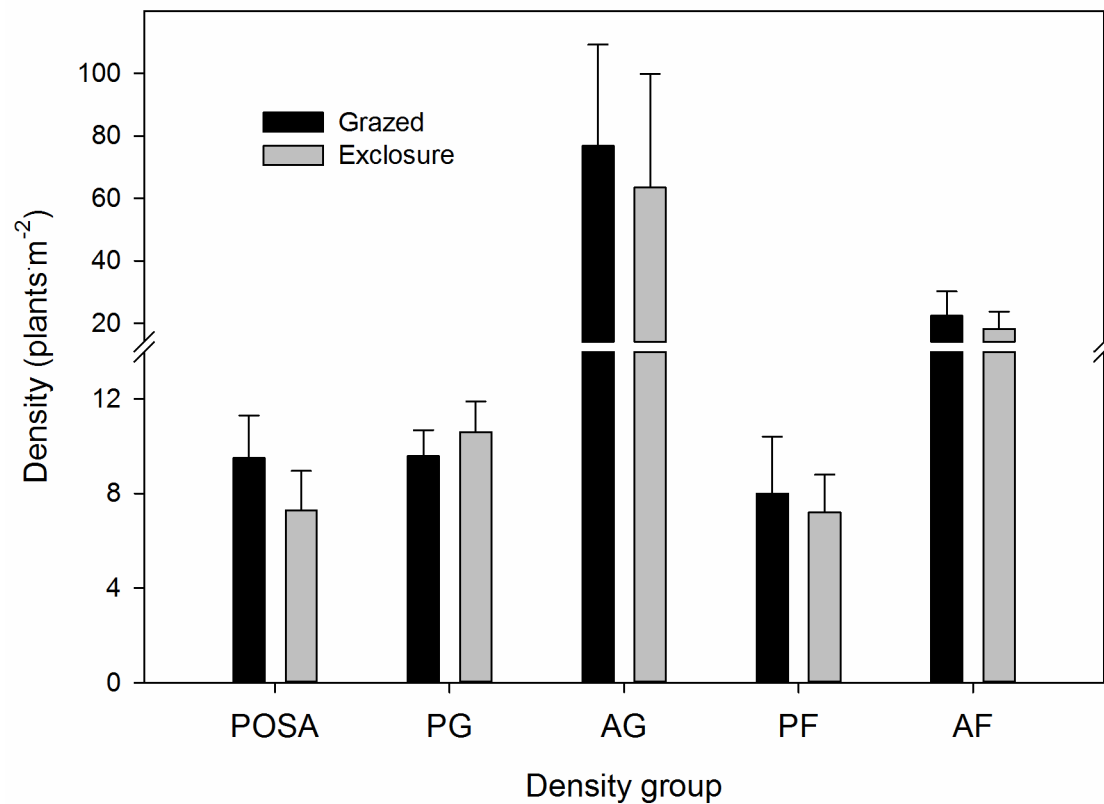




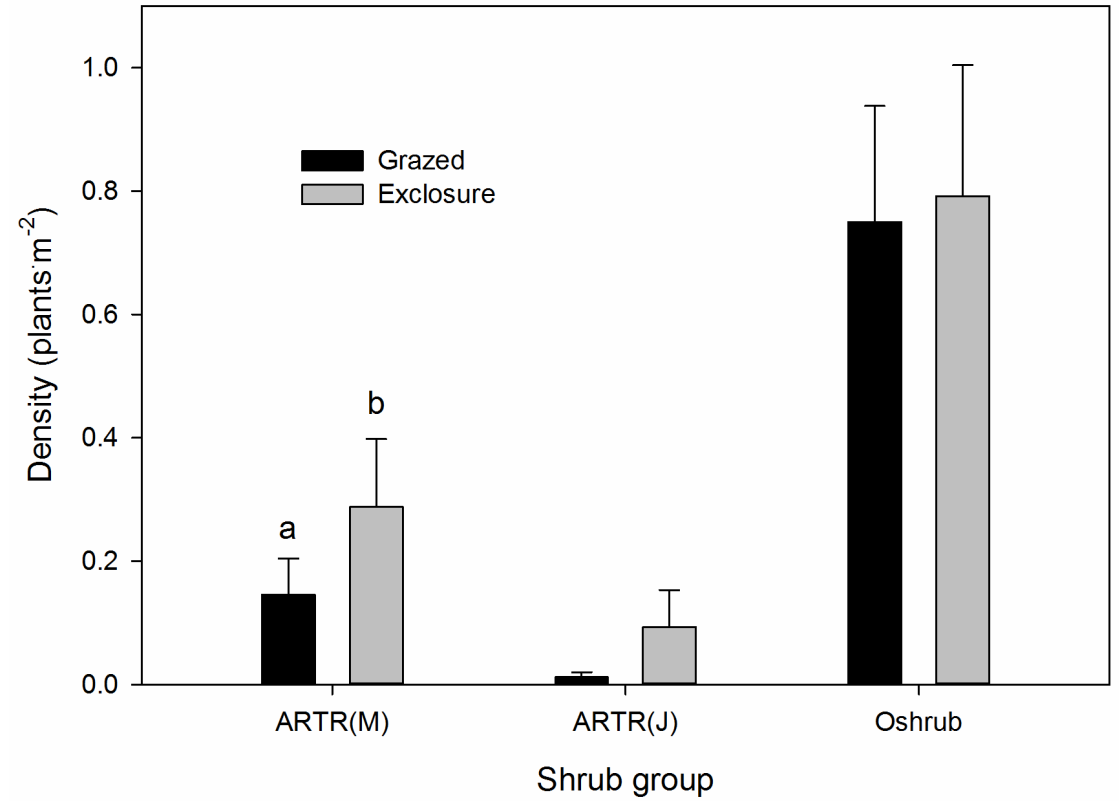
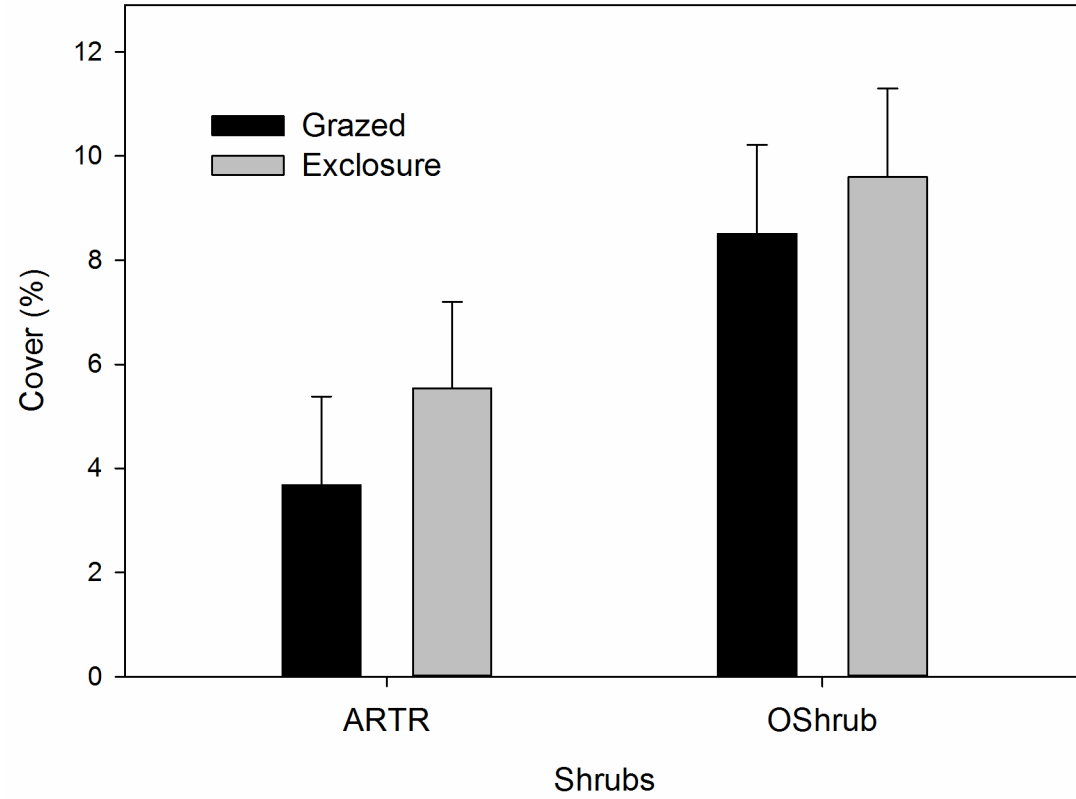




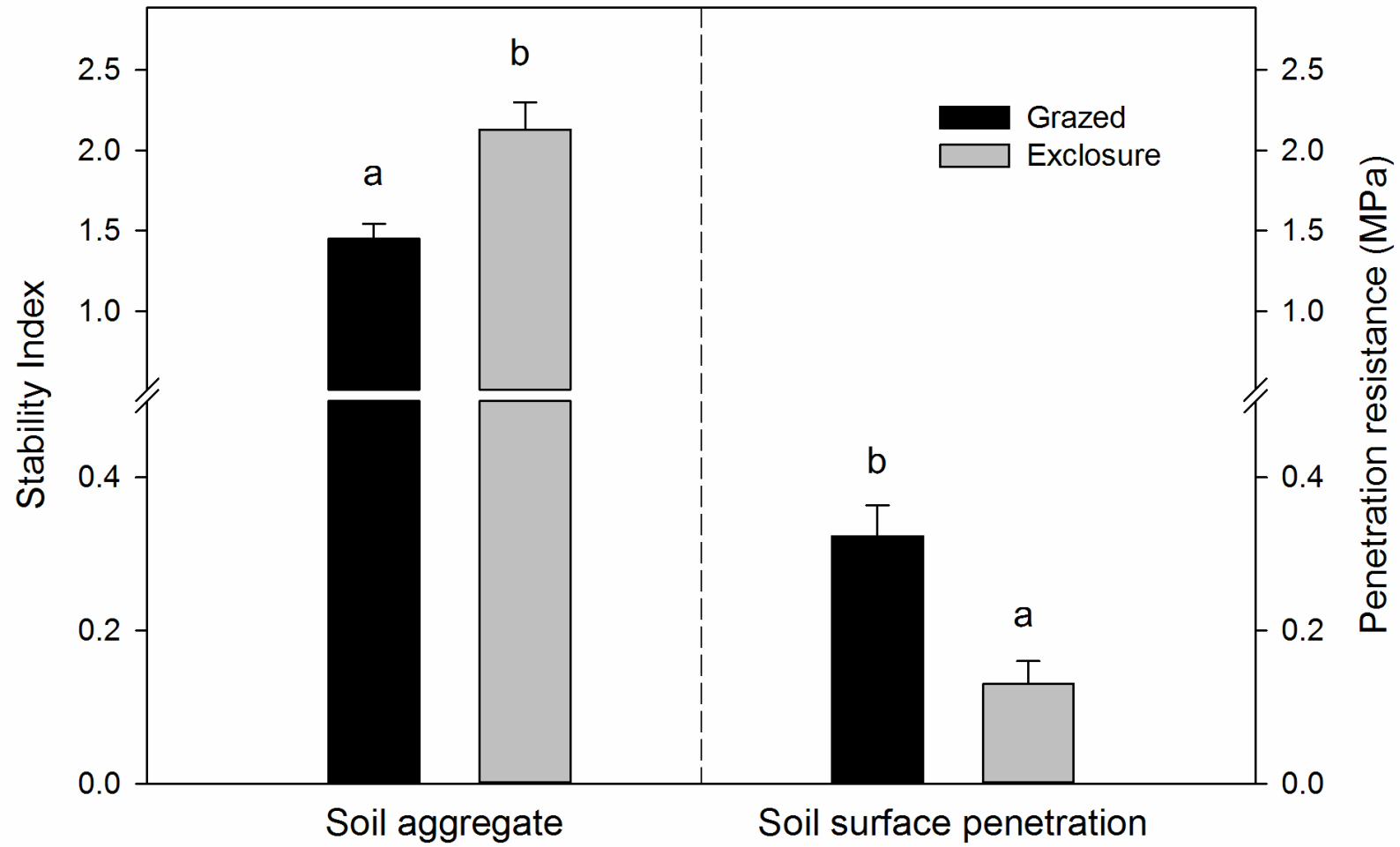




Plant community response to feral horse grazing



Shrub response to feral horse grazing



Soil Stability and Penetration in response to feral horse grazing



Outside the horse exclosures



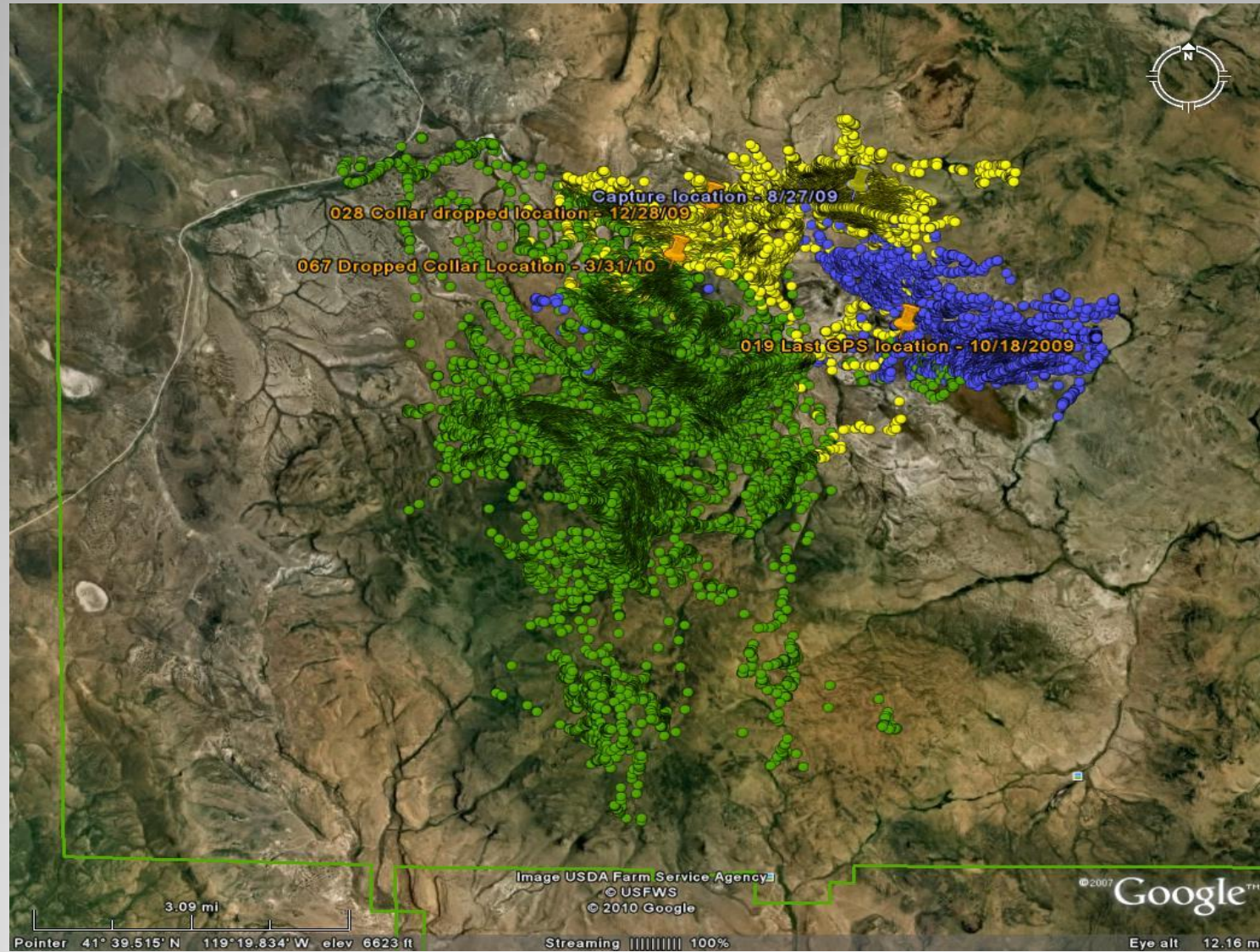


Forage availability and stable isotope sample collection









Feral Horse Distribution Patterns

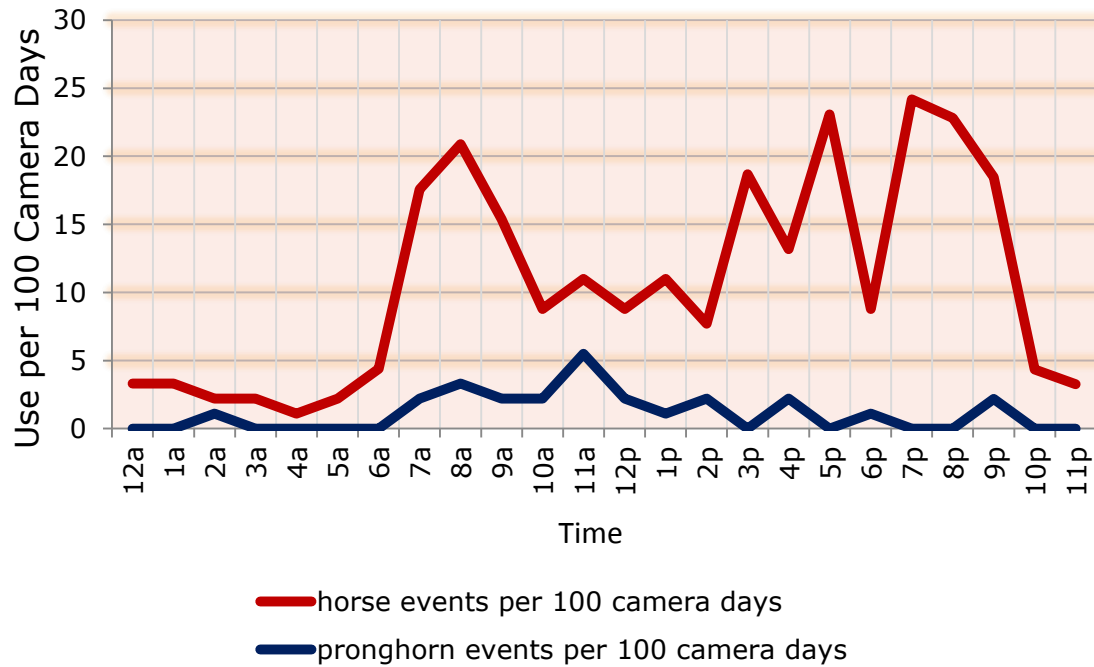
# Horse – Wildlife Interactions

- Interactions of horses with wildlife (competition)
  - Water
  - Forage
  - Habitat (space)
- Effects can be either
  - direct (removing or trampling habitat)
  - indirect (shift in vegetation composition)

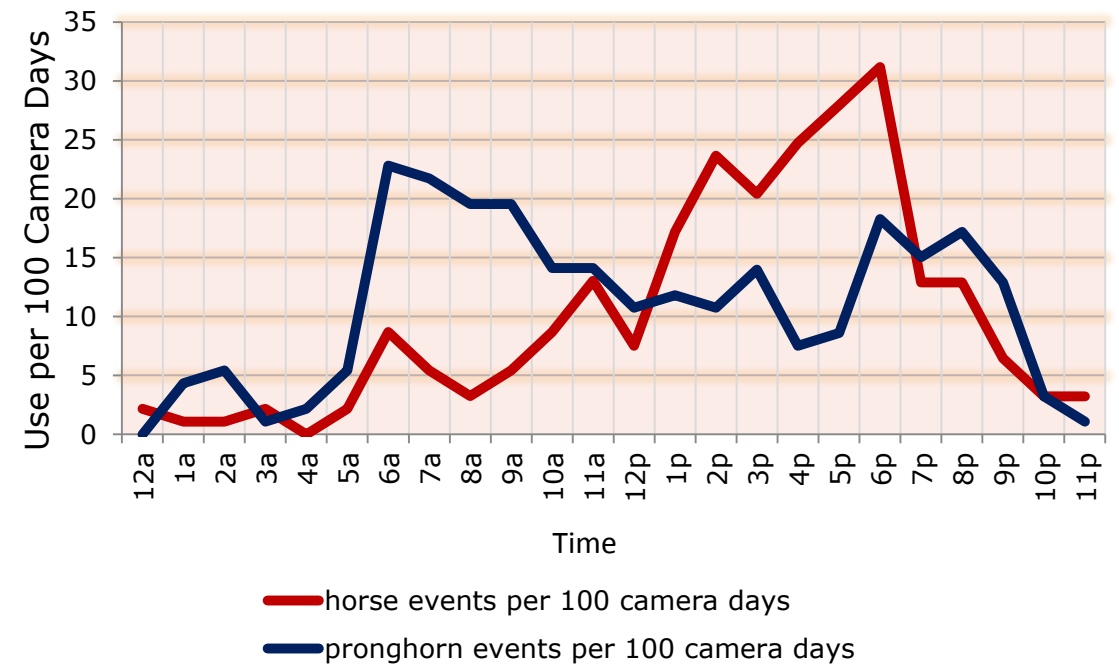




2012 Hourly Horse and Pronghorn  
Use SID171



2012 Hourly Horse and Pronghorn  
Use SID32



Interactions between horses and pronghorn at water sources

## Bird & Mammal Richness

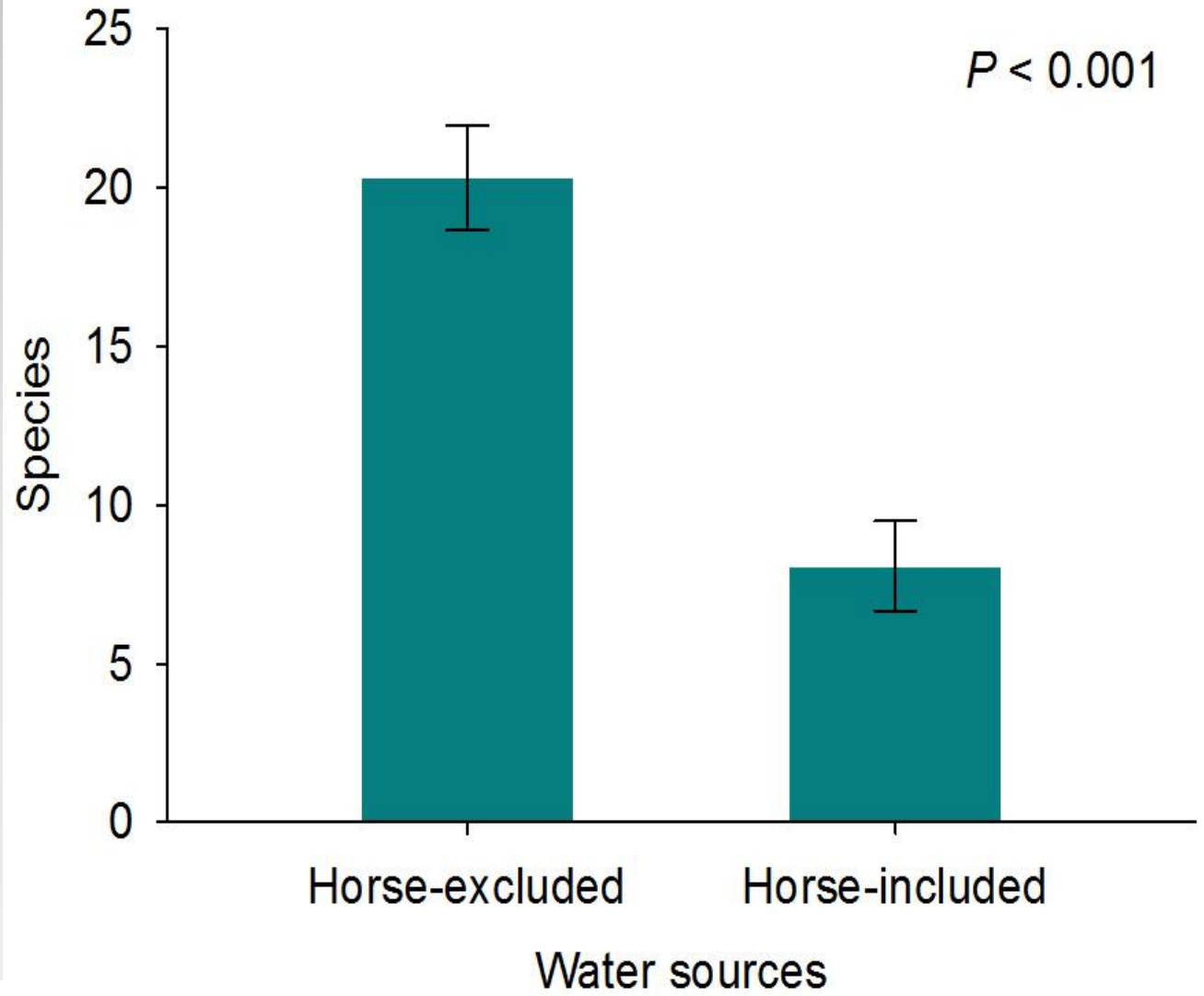
300 horses in Dugway, Utah

12 included, 13 excluded sites

75 total species

Species included:

- Mourning dove
- Pronghorn
- Mule deer
- Black-tailed jackrabbit
- House finch
- Black-billed magpie

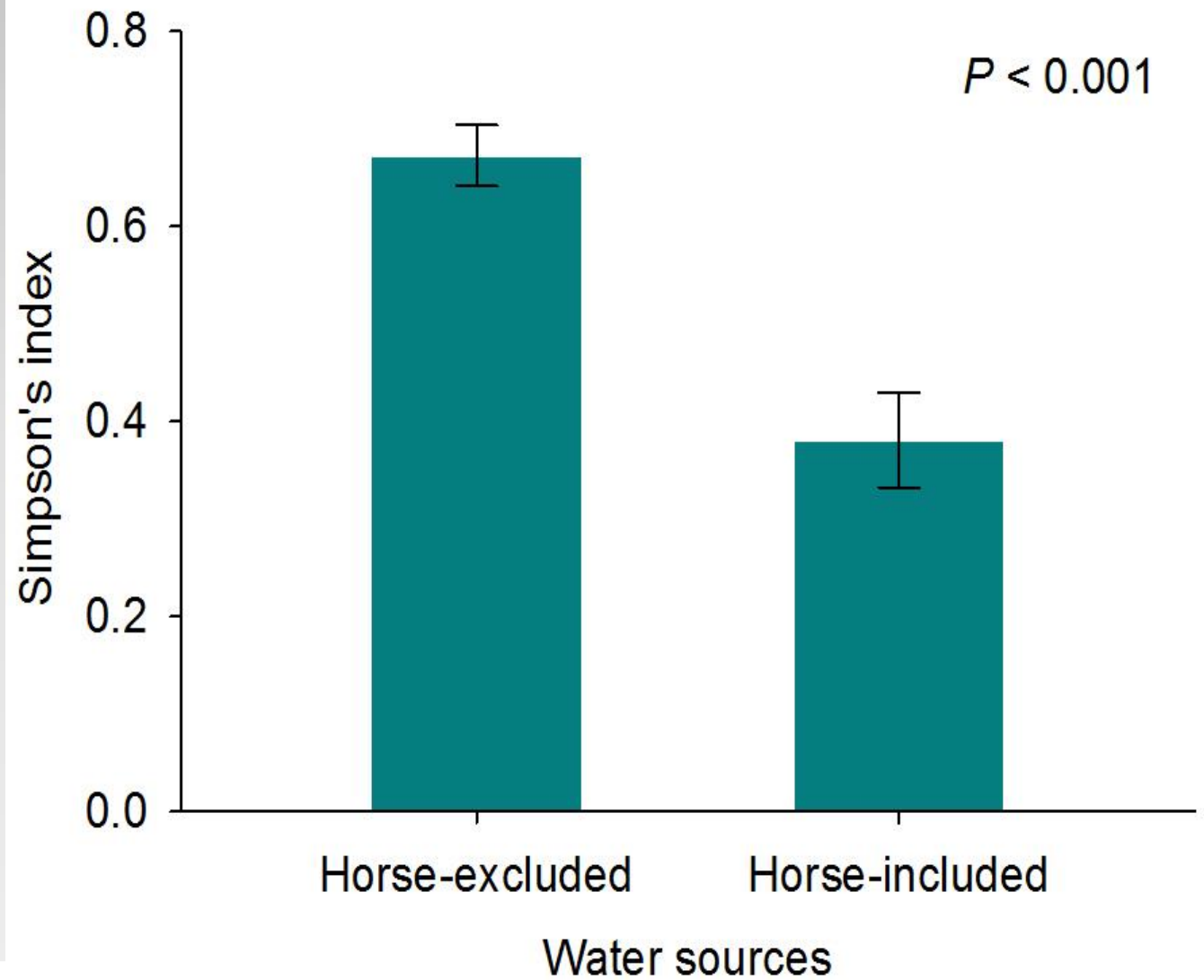


Hall et al., *in review*

## Bird & Mammal Richness

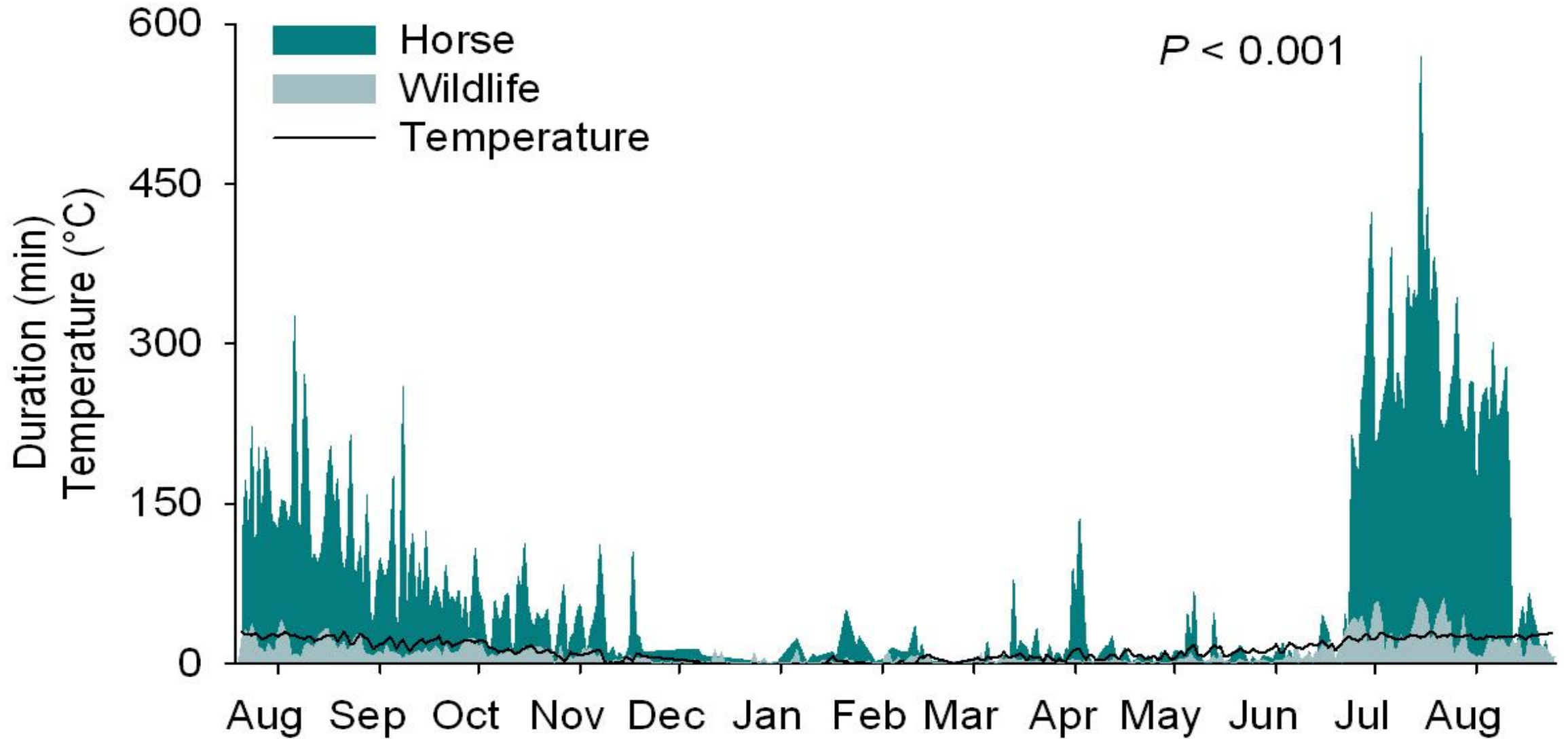


Hall et al., *in review*



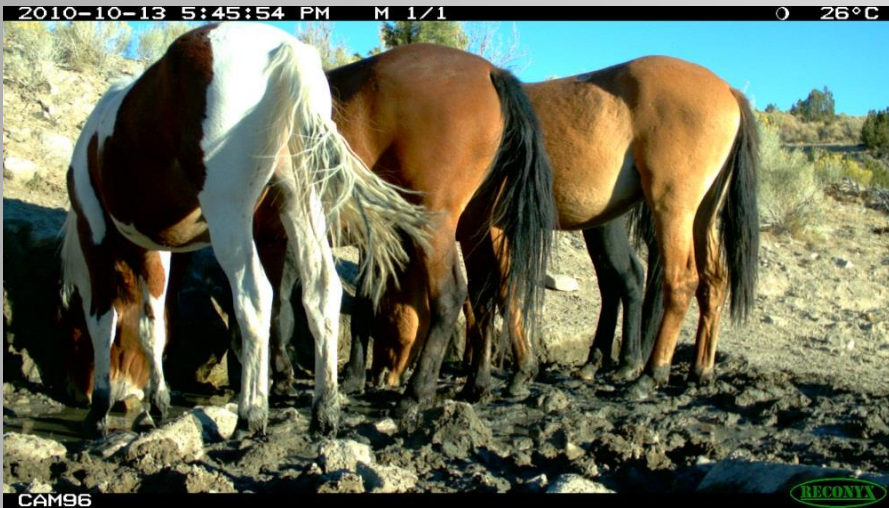
## Bird & Mammal Diversity

Hall et al., *in review*

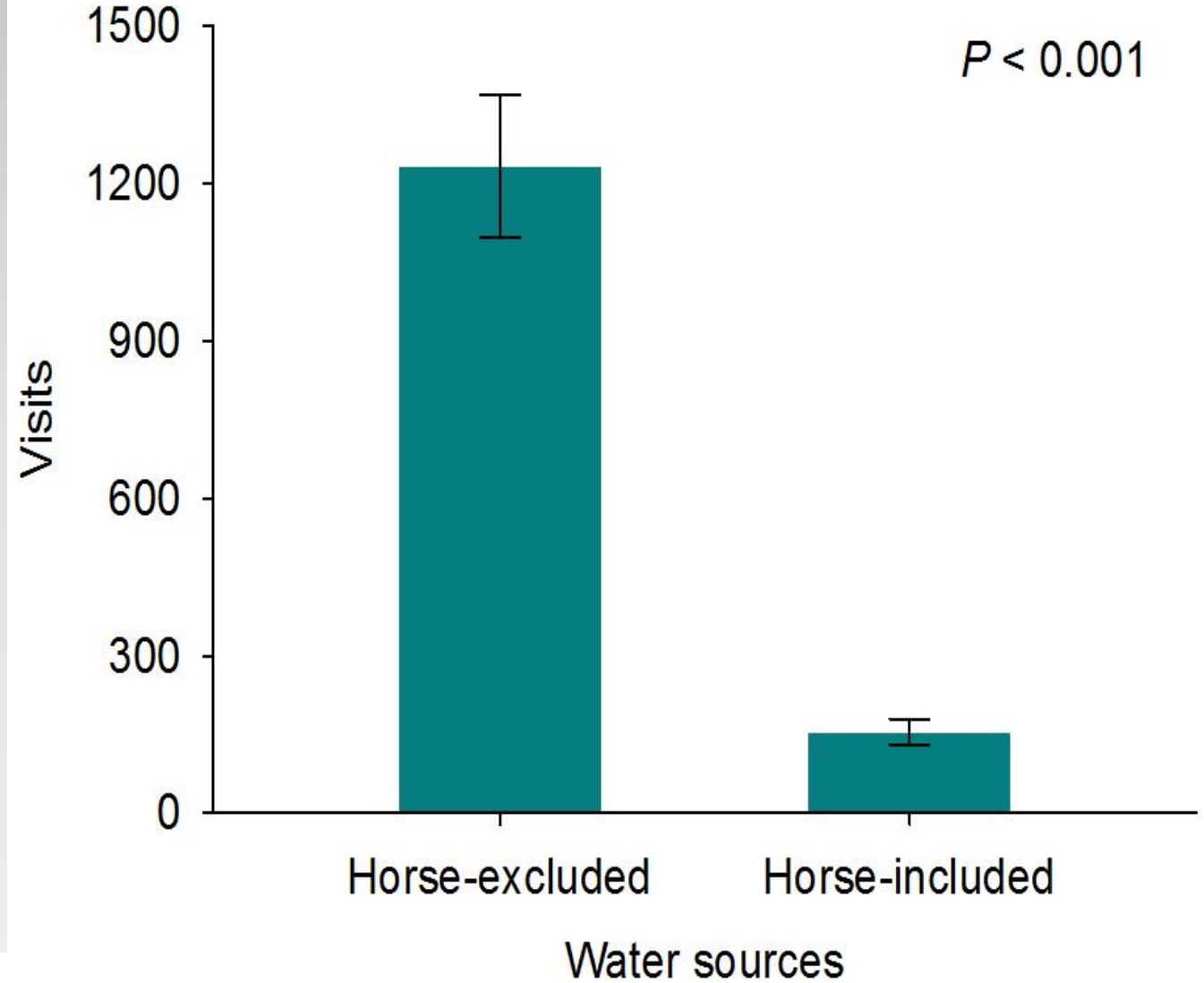




## Wildlife Visits



Hall et al., *in review*



# Horses and Greater Sage-grouse

- Habitat (sagebrush cover and density)
- Hiding cover (nesting and brood-rearing)
- Late brood-rearing habitat in wet meadow areas



# **Rangeland Management Success**

- Increasingly dependent on a managers knowledge of range management, agronomy, animal husbandry, and wildlife management
  - Integrated (coordinated) resource planning
- Need skilled personnel who can evaluate rangeland condition and assess risk
- Implement technological advancements to improvement management strategies



Thank you





